

Embryonic Stem Cell-Derived Therapies Targeting Cardiac Ischemic Disease

Grant Award Details

Embryonic Stem Cell-Derived Therapies Targeting Cardiac Ischemic Disease

Grant Type: Comprehensive Grant

Grant Number: RC1-00124

Investigator:

Name: Randall Lee

Institution: University of California, San Francisco

Type: PI

Disease Focus: Heart Disease

Human Stem Cell Use: Embryonic Stem Cell

Award Value: \$2,424,353

Status: Closed

Progress Reports

Reporting Period: Year 2

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Reporting Period: Year 3

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Reporting Period: Year 4

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Reporting Period: Year 5 NCE

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Grant Application Details

Application Title: Embryonic Stem Cell-Derived Therapies Targeting Cardiac Ischemic Disease

Public Abstract: Cardiovascular disease (CVD) is the leading cause of death in the United States. Over one million Americans will suffer from a new or recurrent heart attacks this year and over 40 percent of those will die suddenly. In addition, about two-thirds of the patients develop congestive heart failure; and in people diagnosed with CHF, sudden cardiac death occurs at 6-9 times the general population rate. Heart transplantation remains the only viable solution for severely injured hearts; however, this treatment is limited by the availability of donor hearts. Therefore, alternative strategies to treat end stage heart failure and blocked blood vessels are needed. The objective of this proposal is to determine whether human embryonic stem (hES) cell can be used for repairing the heart. Our collaborator Advanced Cell Technology (ACT) has recently succeeded in identifying conditions for the reproducible isolation of hES cells which have the characteristics of cells which form blood vessels and heart muscle. This proposal will assess whether the hES cells can form new functional blood vessels and repair injured heart muscle in a rat model of heart attacks. Results from these studies will help develop new therapies for treating patients with heart attacks.

Statement of Benefit to California: Cardiovascular disease (CVD) is the leading cause of death in California and the United States. Over one million Americans will suffer from a new or recurrent myocardial infarction this year and over 40 percent of those will die suddenly. In addition, about two-thirds of myocardial infarction patients develop congestive heart failure. The 5-year mortality rate for CHF is about 50%, and in people diagnosed with CHF, sudden cardiac death occurs at 6-9 times the general population rate. Heart transplantation remains the only viable solution for severely injured hearts; however, this treatment is limited by the availability of donor hearts. It is estimated that health care costs for CVD is over 18 billion dollars a year. Additionally, the morbidity associated with CVD cost California and the nation billions of dollars a year. Therefore, alternative strategies to treat end stage heart failure and ischemia are needed. (Source: American Heart Association. Heart Disease and Stroke Facts, 2004, Dallas, TX: AHA 2004; American Heart Association. Heart Disease and Stroke Statistics-2006 Update, Dallas, TX: AHA 2006).

The field of regenerative medicine is important to California and the nation. Advances in the technology to find cell based therapies will be revolutionary in their impact on patient care. Human embryonic stem (hES) cells have the potential to become all of the cells in the human body, and their unique properties give researchers the hope that from these primitive cells new therapies can result that may be available in time for the looming health care crisis. This project is focused on a pre-clinical application of a specific hES cell based therapy for myocardial regeneration and an antibody targeting technology to direct stem cells to injured organs. This project will benefit California in several ways including: 1) support for UC trainees, 2) potential of developing important clinical trials in CA based on results from this proposal, and 3) enhancement of the biotechnology industry in CA which would lead to the creation of new jobs in CA and an enhanced tax base.

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